

# NSF Study: Efficacy of an Ozone-Generating Whole-Shoe Disinfection Device at Three Time Points

Jesse D. Miller, Ph.D., Victoria Standard, Robyn Collins

National Science Foundation International, Patho3gen Solutions based on NSF Study in Ann Arbor Michigan

## ABSTRACT

An efficacy study was performed using a UV-C and Ozone-generating device, the PathO3Gen Solutions™ Footwear Sanitizing Station, against *Escherichia coli* (*E. Coli*), *Pseudomonas aeruginosa*, *Methicillin-resistant Staphylococcus aureus* (*MRSA Super bug*), *Vancomycin-resistant Enterococcus faecalis* (*VRE*), *Carbapenem-resistant Klebsiella pneumoniae*, *Candida auris*, *Aspergillus brasiliensis*, and *Clostridioides difficile* (*C. diff*). And log and percent reduction were quantified for each microorganism at three exposure times: 6, 8, and 10 seconds.



## OBJECTIVES

The main motivation of this study was to find the effectiveness of the patented UV-C and Ozone device to destroy eight of the most common / severe bacterial, fungi, spore infections that affect healthcare facilities and spread over surfaces such as floors. At three different time intervals to find the effectivity at each interval.

## METHODS

Each microorganism was individually inoculated on separate petri dishes and incubated at appropriate temperatures for a specific time period to allow for growth and colonization. Control samples were taken as well for all.

After the preparation of the microorganisms, a shoe sole (hard rubber substitute) was inoculated with the bacteria and then placed onto the sterilized foot sanitizing station with a 150 lb. volunteer on top of the shoe with a sterile barrier between them. The shoe and volunteer remained on the sanitizing station for each designated testing time period of 6, 8, and 10 seconds. Three tests were completed per microorganism, and time period. From the hard rubber substitutes inoculated with bacteria, two samples were taken from the shoe and placed in a petri dish and incubated for the appropriate lengths of time at specific temperatures.

After incubation, the viable microorganism colonies were counted, and data recorded. From the sample and control dishes, log percent reductions were calculated.



## RESULTS

The results from this study showed that for every type of bacteria, fungi, and spore tested, a reduction of at least 90% was seen. Meaning that from the viable bacteria which infected the sole of a shoe, the FSS was able to destroy, at its lowest time interval and toughest organism, 90% of the microorganism. It kills *Candida auris* at 5.16 log in 10 seconds which is 99.999% which is very difficult and unheard of from any other product

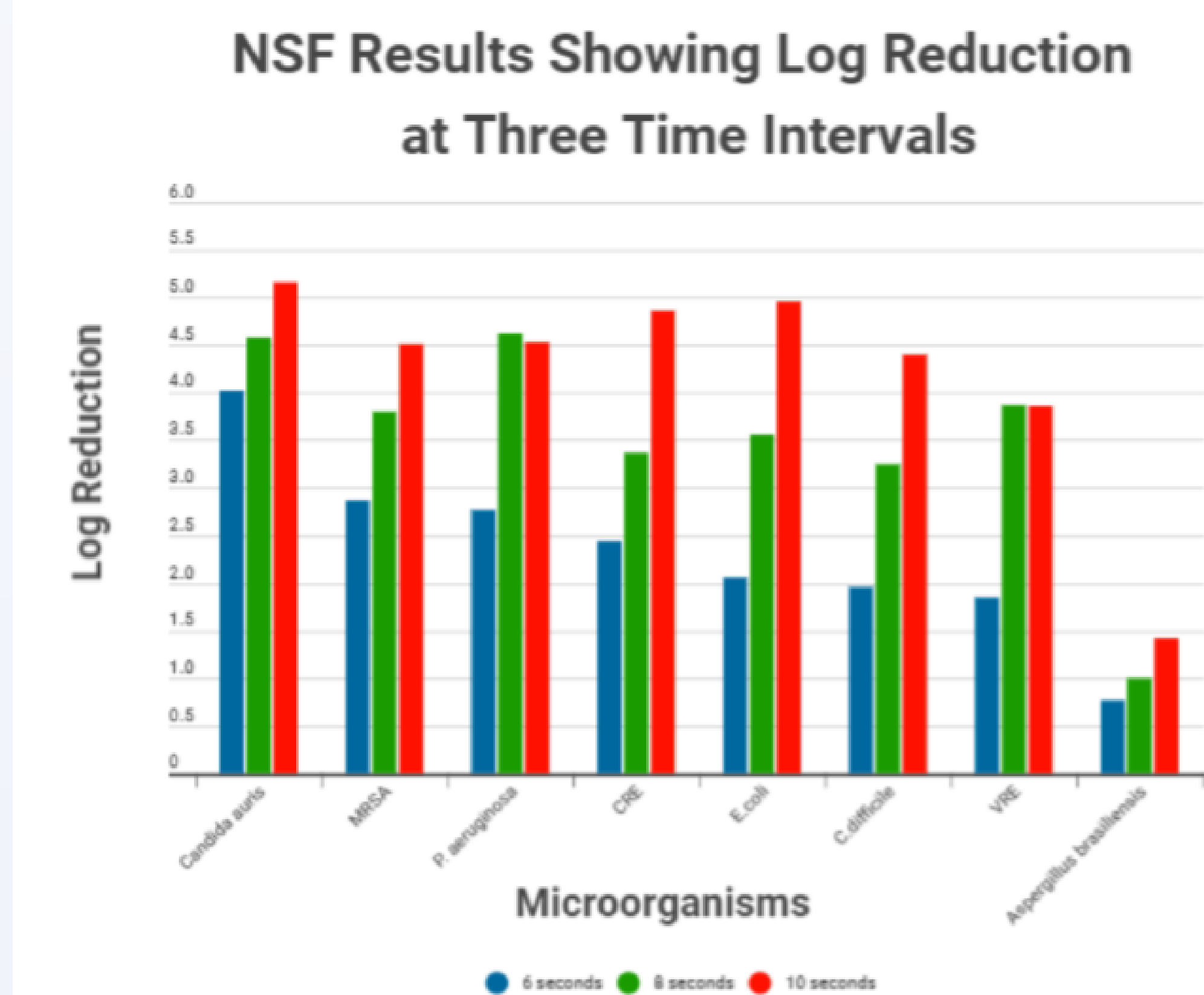


Figure 1. The Summary bar plot of mean log reduction at each time point (in seconds) by microorganism tested.

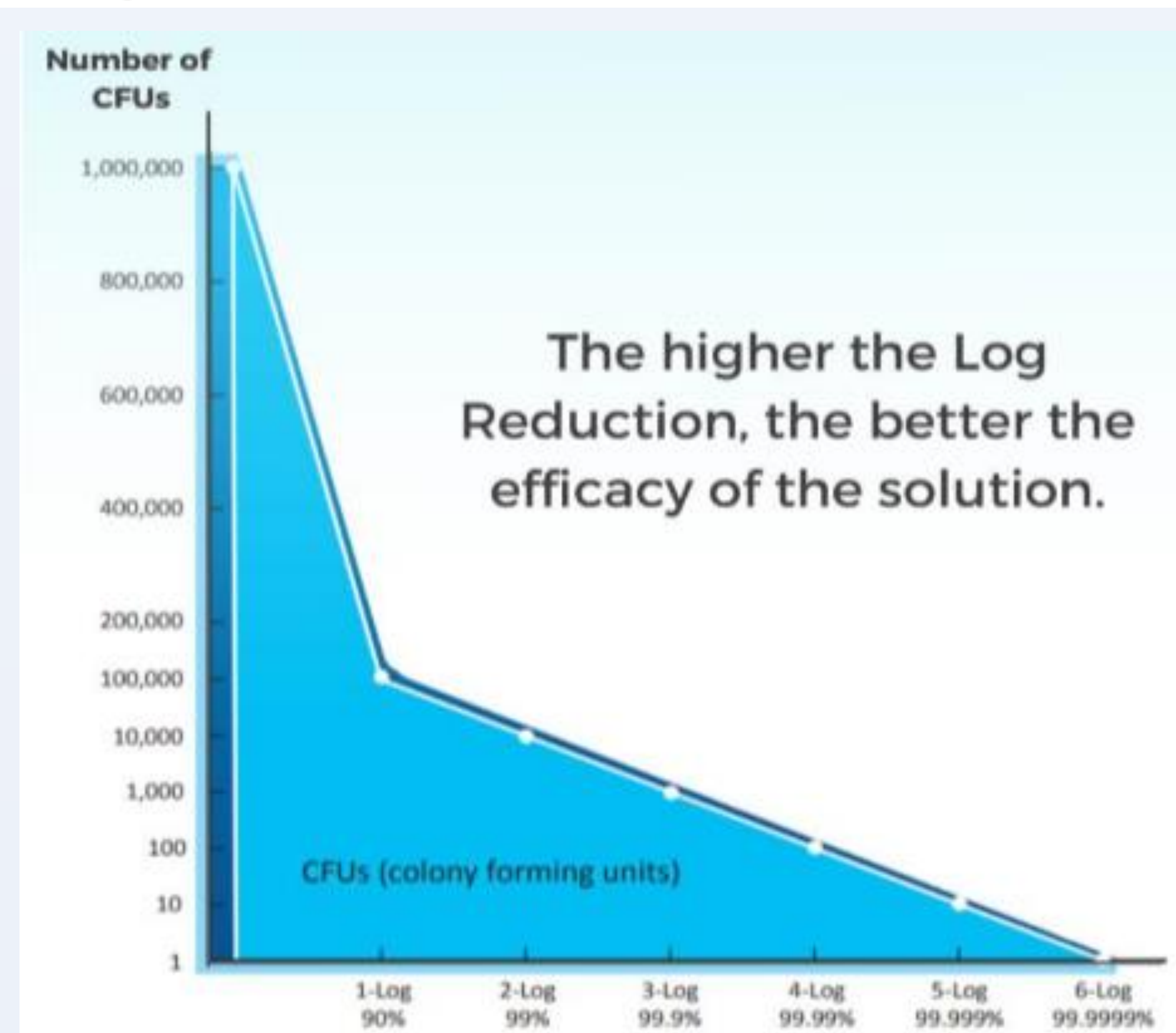


Figure 2. The graph demonstrates what Log reduction is.

## CONCLUSION

The Footwear Sanitizing Station is a uniquely innovative product with UVC and Ozone patented technology that effectively kills microorganisms at the high log percentages at 6, 8, and 10 second intervals. It kills *CRE*, *VRE*, and *MRSA* at percent, two log over industry gold standards.

Why is this study important, because floors matter! Floors are a probable source of infection transmission. In the study by Abhishek Deshpande, MD, Ph.D., and colleagues, researchers cultured 318 floor sites from 159 patient rooms (two sites per room) in five Cleveland-area hospitals. The hospital rooms included both *Clostridium difficile* infection (CDI) isolation rooms and non-CDI rooms. Researchers also cultured hands (both gloved and bare, to simulate different scenarios of people picking things up off the floor) as well as other high-touch surfaces such as clothing, call buttons, medical devices, linens, and medical supplies.

The researchers found that floors in patient rooms often were contaminated with *methicillin-resistant Staphylococcus aureus* (*MRSA*), *vancomycin-resistant Enterococci*, and *C. difficile*, with *C. diff* being the most frequently recovered pathogen in both room types.

Denaturing pathogens before they can enter the hospital by placement of stations at the entrance and exits (the perimeter) and in high risk areas can reduce the microbial load that leads to the spread of infections.

## REFERENCES

Jesse D. Miller, Ph.D., NSF International



PHONE: 727 – 300 – 1069

WEBSITE: [www.patho3gen.com](http://www.patho3gen.com)

